SPACE & AIR TRAFFIC MANAGEMENT SYSTEM (SATMS)

Routine Access to Space Through Integrated Space & Aviation Operations in the NAS

COMMERCIAL SPACE TRANSPORTATION IN THE NATIONAL AIRSPACE SYSTEM

CONCEPT OF OPERATIONS

Shelia Helton-Ingram, AST-100

PRESENTER

Shelia C. Helton-Ingram

Transportation Industry Analyst

FAA Office of the Associate Administrator for Commercial Space Transportation (AST)
Space Systems Development Division (AST-100)
800 Independence Ave., SW, Room 331
Washington, DC 20591

(202) 267-8863
Shelia.Helton-Ingram@faa.gov

REGULATORY BACKGROUND

AST is the FAA's only space-related line of business. The evolution of CST regulation is marked by several milestones

1984 Executive Order 12465 and Commercial Space Launch Act (CSLA)

1988 First Launch License Issued

1989 First Commercial Launch

1995 FAA Authorized to License Commercial Launches & Launch Sites

1996 First Launch Site Operator License Issued

1998 Commercial Space Launch Act of 1998, Public Law 105-303, Extended FAA Licensing Authority to Reentry Vehicle Operators and Operation of Reentry Sites by a Commercial or Non-Federal Entity

2000 Reusable Launch Vehicle and Reentry Licensing Final Rule Issued

2004 First RLV License Issued to Scaled Composites

Second RLV License Issued to XCOR Aerospace

AST REGULATORY AUTHORITY

AST regulates the CST industry within the scope of Title 49, U.S. Code, Subtitle IX, Sections 70101-70119 (formerly the Commercial Space Launch Act)

- AST's primary responsibility is to
  - Protect the public health and safety, safety of property, and national security and foreign policy interest of the United States
  - Ensure compliance with international obligations of the United States
- To meet its responsibility, AST licenses
  - Launch operations
  - Reentry operations
  - The operation of launch and reentry sites
- AST does not license launches by the government (DoD and NASA)

SCOPE OF AST RESPONSIBILITY

Launch Methods & Facilities

Ground Launch

Air Launch

Sea Launch

Launch Sites

Launch Vehicles

Atlas V

Delta IV

Taurus

Zenit 3SL

Pegasus XL

Spaceship 1

SATMS INTIATIVE OVERVIEW

One of AST's corporate initiatives is to foster development of a concept for seamlessly integrating space and aviation operations in a modernized NAS

- SATMS is not proposed as a system separate from the NAS, but rather as a vision for expanding NAS capabilities to support CST operations
- AST provides corporate leadership towards realizing the SATMS vision by
  - Invoking key partnerships with other FAA lines of business, other government agencies, and industry
  - Instituting the Space and Air Traffic Working Council (SATWC) as a forum for discussion and resolution of issues of mutual concern
  - Developing the Concept of Operations for CST in the NAS
  - Identifying the impacts of the CST Conops on the NAS Architecture

SATMS CONCEPT OVERVIEW

The SATMS Concept of Operations provides a high level description of CST operations, emphasizing the transition of space vehicles through the NAS

- Launches and reentries will ultimately occur on a routine basis
  - Numerous spaceports
  - Wide range of trajectories
- Commercial space operations will have no national security priority over other airspace users
- To integrate space missions into the NAS environment, the protected airspace provided to space missions will be reduced in comparison to today

Space & Air Traffic Management System (SATMS)

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FUTURE SPACEPORT CAPACITY

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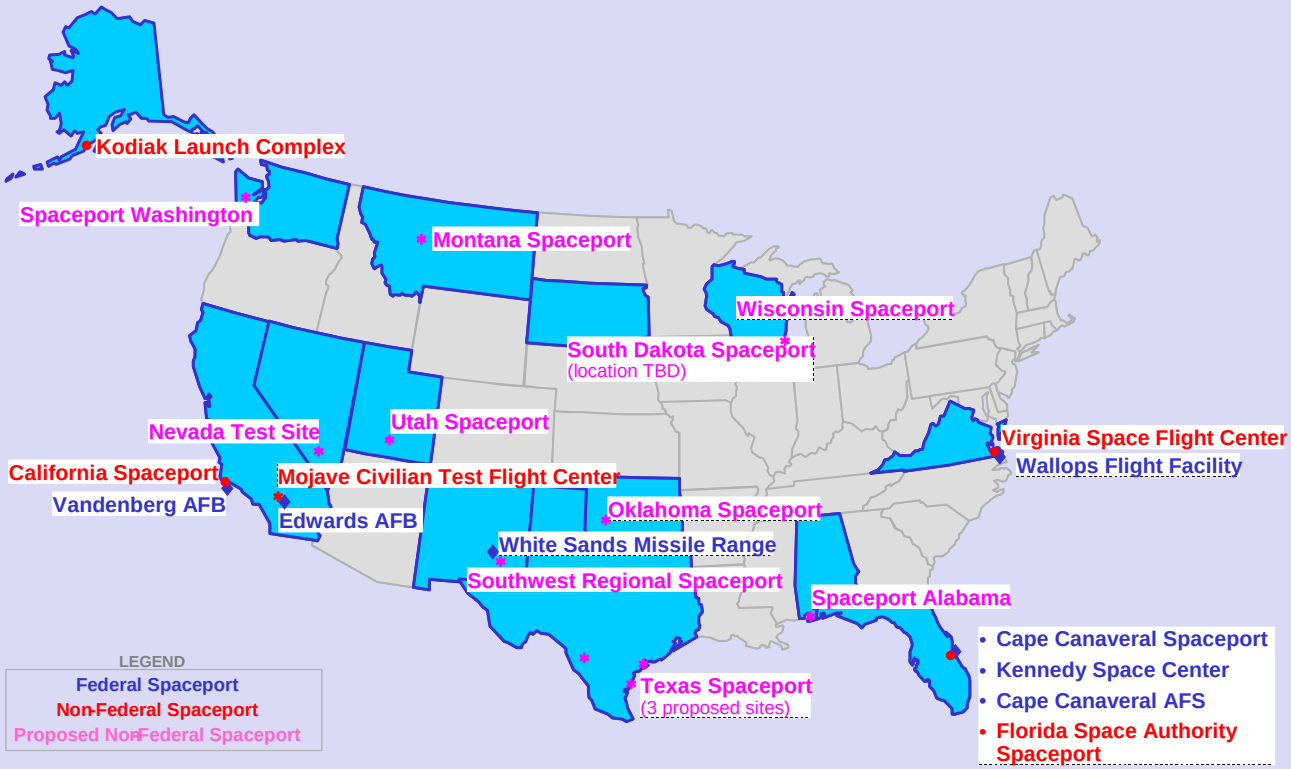
In the future, numerous coastal and inland launch facilities will support commercial launches and recoveries



FUTURE OPERATIONAL TECHNIQUES

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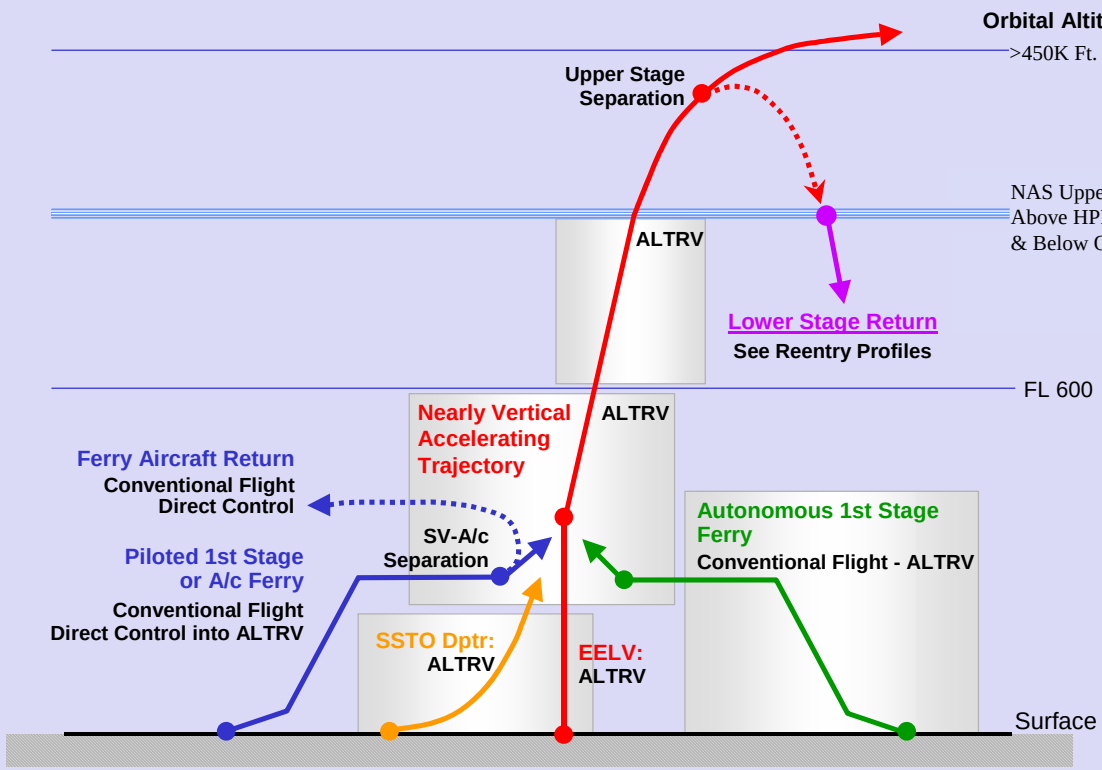
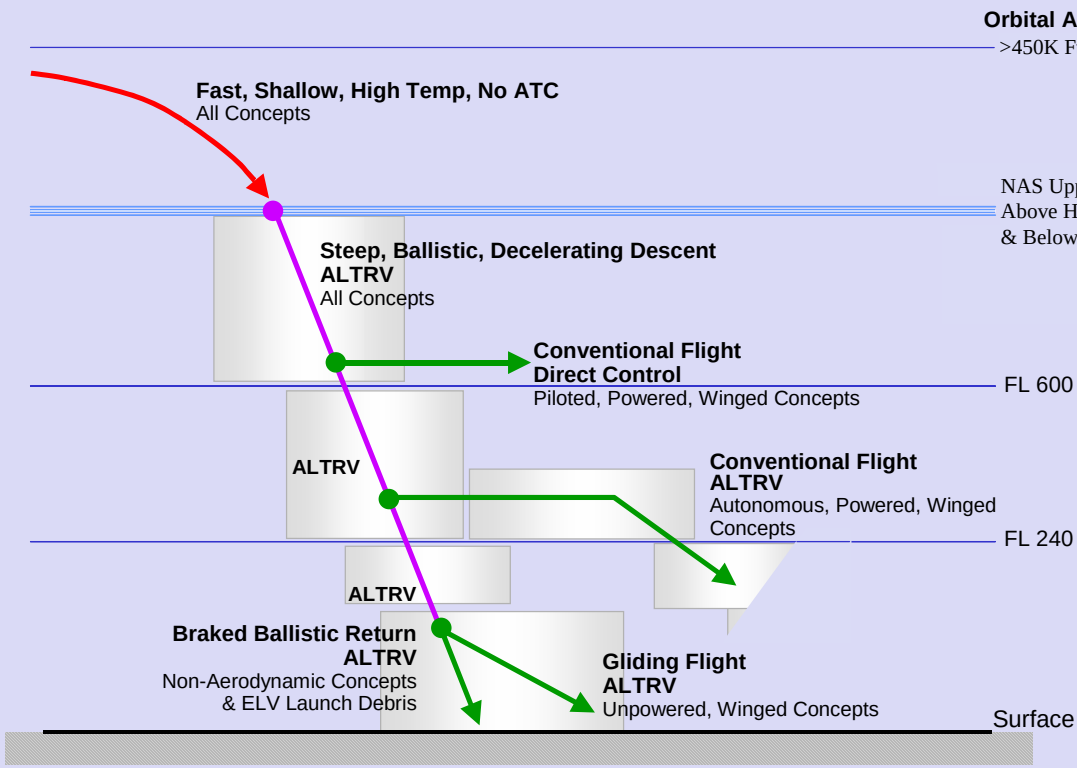
A wide variety of launch techniques will be utilized by the various types of space vehicles



FUTURE OPERATIONAL TECHNIQUES

A wide variety of techniques will also be used for reentry & landing



FUTURE INDUSTRY ENVIRONMENT

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The commercial space industry will ultimately operate in a mature technical, regulatory, and operational environment

- Technical & Regulatory Environment
  - Space vehicles
  - Spaceports
  - Airspace, automation, and procedural functions
  - Regulation & Certification
  - Security
- Operational Environment
  - Mission planning
  - Launch, and ascent through the NAS
  - Reentry, descent through the NAS, and landing

TECHNICAL & REGULATORY ENVIRONMENT

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Space Vehicles will be characterized by reusability, launch & reentry technique, mode of pilotage, etc.

Spaceports will provide conventionalized services for launches & reentries at coastal, inland, and sea-based locations (and at some existing airports)

Airspace will accommodate space missions through new philosophies and structures (Space Transition Corridors, etc.)

Automation will provide information distribution and decision support to integrate space operations into the NAS

Operational Procedures will enable safe & equitable delivery of NAS services

Regulations & Certification of space vehicles, personnel, and infrastructure will be similar to aviation regulatory requirements

Security for space operations will be implemented in a similar manner to commercial aviation

OPERATIONAL ENVIRONMENT

Mission Profile Development will produce an end-to-end mission plan from launch through reentry & landing

Mission/Traffic Integration will be accomplished by implementing a 'Traffic Management Initiative' for each operation

Launch/Takeoff will be coordinated through automation to ensure the departure is integrated with other traffic, and is cleared by ATC

Ascent Through The NAS will utilize various combinations of STCs and positive ATC, as appropriate for each vehicle type

Reentry will be coordinated with ATC well prior to the event

Descent Through The NAS will be handled either by STC to the surface, or by STC for initial descent, then positive ATC to the surface

CURRENT SATMS ACTIVITIES

Traffic Flow Modeling. Preliminary simulations have been conducted to determine the impact of CST operations on aviation traffic

JPDO Participation. The Joint Planning & Development Office is defining the NAS capabilities needed to support future operations in the airspace

Operational & Architectural Studies. AST is continually refining the SATMS Conops description of CST operations, and determining the impact of those operations on the NAS architecture

SATMS Marketing Plan. Communications plans and materials are being developed that will facilitate outreach to all relevant elements of society on behalf of the CST industry

SUMMARY

The CST Concept of Operations describes the equitable joint use of the NAS by both space and aviation users

- The SATMS operational objective is to integrate space vehicles into the NAS environment while minimizing the impact on conventional air traffic
- Fully integrated space and air transportation operations will provide the foundation for routine & affordable access to space
- Routine & affordable access to space will ultimately serve to
  - Foster economic growth through the commercial exploitation of space
  - Enhance quality of life through technological innovation
  - Establish leisure activities in space
  - Facilitate accelerated scientific discovery